ECOSYSTEM STATUS INDICATORS
Nutrients and Productivity

Variations in phytoplankton and nutrients during fall 2000-2004 in the eastern Bering Sea- BASIS

Lisa Eisner, Ed Farley, Jim Murphy, Auke Bay Laboratory, NMFS
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Oceanographic and fisheries data have been collected in the Eastern Bering Sea (EBS) during fall 2000-2004 for the U.S. component of a multiyear international research program, Bering-Aleutian Salmon International Survey (BASIS; Figure 39). Stations were located between 54°N and 68°N, at 15-30 km resolution, although spatial coverage varied by region and by year. Bristol Bay stations were sampled from mid August to early September during all five years. While, stations in the central and northern Eastern Bering Sea were generally sampled from mid September to mid October. Forage fish were captured with a surface net trawl and oceanographic data were obtained from vertical conductivity-temperature-depth (CTD) profiles and laboratory analyses of discrete water samples at select depths (2003 and 2004 only). Oceanographic variables include temperature, salinity, nutrients, chlorophyll a, and phytoplankton taxonomic characteristics (based on phytoplankton species identification and chlorophyll a size fractionation). A long-term goal of this research is to characterize interannual variations in the abundance and distribution of lower and higher trophic level organisms in relation to oceanographic features in the EBS (see the *Physical Environment* and *Forage Fish* sections of this report).

Upwelling through Unimak Pass provided nitrate that fueled phytoplankton growth, indicated by high surface chlorophyll a and nitrate in coastal waters near Amak I., south Bristol Bay in both 2003 and 2004 (Figure 40). Surface phytoplankton cells were generally small (< 10 μm) except in a few locations near-shore (where diatoms were likely abundant). High nitrate concentrations were seen below the pycnocline in the Middle Domain in Bristol Bay (Figure 39). Subsurface phytoplankton blooms were observed near the base of the pycnocline in Bristol Bay (mid August to early September) at depths where nitrate was replete. In contrast to Bristol Bay, low 40 m nitrate concentrations were observed below the pycnocline in the central EBS (mid to late September). High ammonium concentrations were observed below the pycnocline in low temperature waters (3.5 – 4 °C) in Bristol Bay (Figure 39). These ammonium values may provide a broad indicator of prior production over the growing season.

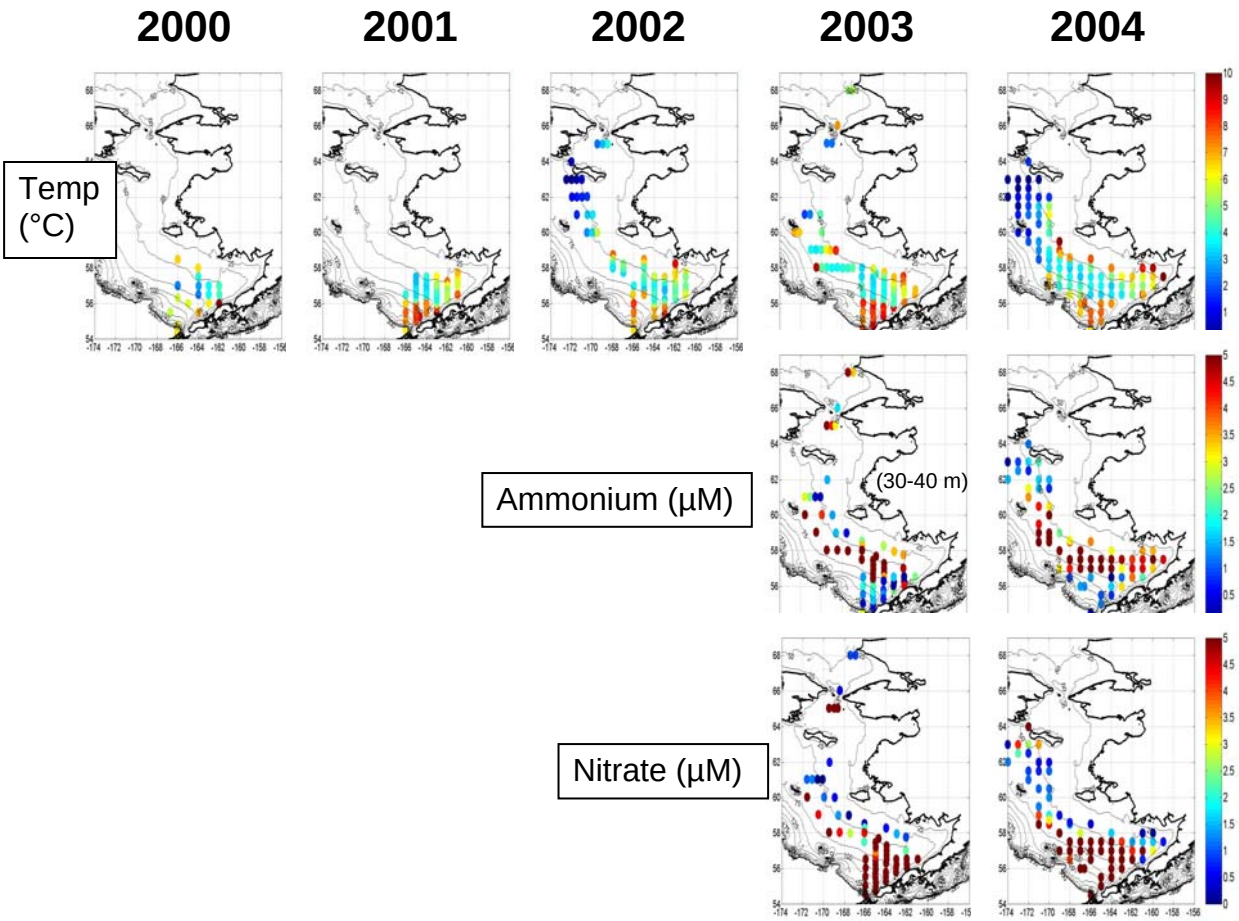

Figure 39. Deep (40 m, unless indicated) temperature, ammonium and nitrate concentrations during fall in the EBS.

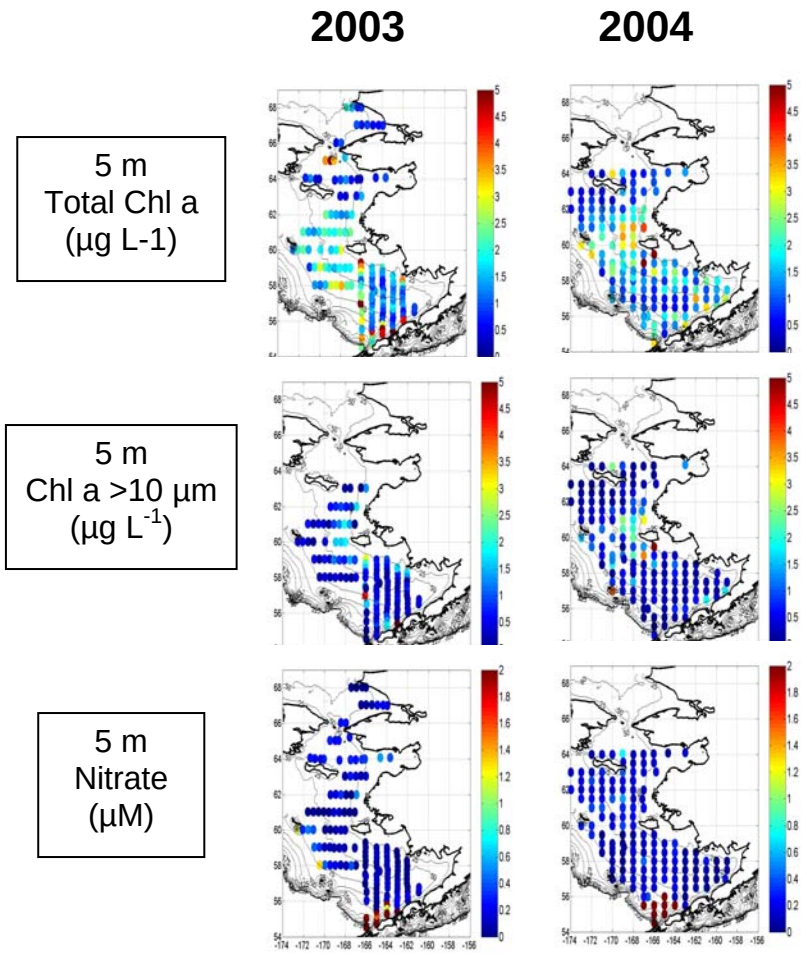

Figure 40. Surface (5 m) total chlorophyll a, chlorophyll a size fraction > 10 µm, and nitrate concentrations in the EBS during fall 2003 and 2004.